Helping Massachusetts Municipalities Create a Cleaner Energy Future

COMMONWEALTH OF MASSACHUSETTS

Deval L. Patrick, Governor
Richard K. Sullivan, Jr., Secretary
Mark Sylvia, Commissioner

Wastewater Heat Recovery Request for Information

Aimee Powelka, Green Communities Division

Bram Claeys, Renewable Energy Division

Department of Energy Resources

Webinar

July 31, 2013

10:00 AM

The webinar will start in a few minutes…

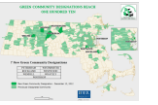
1

Green Communities Division

Serves as the hub for all Massachusetts cities and towns on energy matters

Helping Massachusetts Municipalities Create A Cleaner Energy Future

Green Communities Division
Programs & Resources for Municipalities

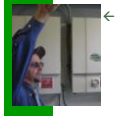


- Green Communities Designation and Grant Program
- MassEnergyInsight energy tracking tool
- Municipal Energy Efficiency Program
- Renewable Energy and Alternative Transportation
- Performance Contracting Technical Assistance (EMS)
- Website filled with tools & resources - www.mass.gov/doer
- Email updates via listserv – Sign up by sending an email to: join-ene-greencommunities@listserv.state.ma.us

Helping Massachusetts Municipalities Create A Cleaner Energy Future

CONTACTS - REGIONAL COORDINATORS

- Regional Coordinators act as direct liaisons with cities and towns on energy efficiency and renewable energy activities
- Located at each of the DEP Regional Offices:



← Southeast – LAKEVILLE: Seth Pickering
Seth.Pickering@state.ma.us

Northeast – WILMINGTON: Joanne Bissetta ->
Joanne.Bissetta@state.ma.us

Central – WORCESTER: Kelly Brown ->
Kelly.Brown@state.ma.us

← Western – SPRINGFIELD: Jim Barry
Jim.Barry@state.ma.us

Helping Massachusetts Municipalities Create A Cleaner Energy Future

Recording & Presentation

- The webinar is being recorded and will be available on our website in approximately 48 hours at: www.mass.gov/energy/greencommunities
- The slide presentation will also be posted at: www.mass.gov/energy/greencommunities
- Websites are also listed at end of presentation

Helping Massachusetts Municipalities Create A Cleaner Energy Future

Helping Massachusetts Municipalities Create a Cleaner Energy Future

COMMONWEALTH OF MASSACHUSETTS

Deval L. Patrick, Governor
Richard K. Sullivan, Jr., Secretary
Mark Sylvia, Commissioner

Wastewater Heat Recovery Request for Information

Aimee Powelka, Green Communities Division

Bram Claeys, Renewable Energy Division

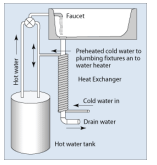
Department of Energy Resources

Hot Water

- Water heating consumes
  - 12% of residential energy
  - 7% of commercial energy
- 80-90% of energy used to heat water in homes goes down the drain

What Is Wastewater Heat Recovery?

- Capture the thermal energy of wastewater through heat exchangers and/or heat pumps
  - Use this energy to heat or cool buildings
  - Extract energy from wastewater drains and pipes exiting buildings or in the street
- Can be done at various locations:
  - within building
  - in sewer pipes
  - at wastewater treatment facility



Wastewater As A Resource?

Water Environment Federation – Water Resource Recovery Facility 3D Tour
http://www.youtube.com/watch?v=A2FmNrEmowE

Rebranding Wastewater As A Municipal Resource

- Netherlands - sewage treatment as energy factories
  - Energy
  - Nutrients
  - Water
- U.S. – Water Environment Federation Energy Roadmap
  - Energy-positive resource recovery facilities
- MA – Clean Energy Results Program (MassDEP/DOER)
  - Goal of 20% net zero facilities by 2020
    - Efficiency
    - Renewable energy:
      - solar PV
      - Anaerobic Digestion
      - Wind
      - In-line hydro
    - Wastewater heat recovery

Why Wastewater Heat Recovery?

- Millions of gallons of heated water flow through sewer and effluent pipes = thermal energy goes to waste
  - Opportunity: reduce energy use and greenhouse gas emissions
  - Helps reposition wastewater treatment facilities as a resource in public perception
  - Potential revenue source for municipalities and wastewater systems
  - Deep energy savings as Green Community

Why Wastewater Heat Recovery?

- DOER has stated interest in alternative sources for heating and cooling of buildings
  - Global Warming Solutions Act: target to reduce GHG emissions with 25% by 2020
  - High reliance on high cost (oil, electricity) or constrained (natural gas) heating fuels
- Includes capturing waste heat
  - Demonstration pilot: $1 million for wastewater heat recovery

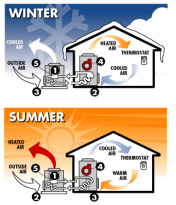
Poll Question 1

We would like to know our audience. Are you a:

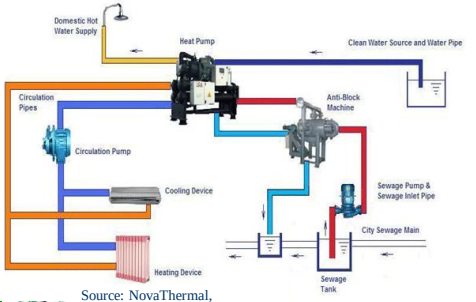
a) Wastewater or Municipal official/staff
b) Wastewater consultant or engineer
c) Representative from an energy service company or Vendor of energy technologies
d) Energy/climate committee member
e) Other

Heat Pumps

- Heat pump technology is well established
  - Heat pumps are used in air conditioners, freezers
- Less tested in wastewater environments
  - Wastewater heat exchangers now available
  - Used in Europe, leaving the U.S. behind
  - Key factor is reasonable maintenance requirements

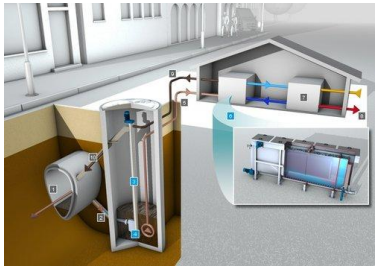


How Wastewater Heat Recovery Works



Source: NovaThermal, http://www.novathermalenergy.com

How Wastewater Heat Recovery Works



Source: Huber Technologies, http://www.huber-technology.com

Wastewater Heat Recovery Example

Source: Metropolitan Water Reclamation District of Greater Chicago

Factors to Take Into Consideration

- Technical
- Financial
- Governance of wastewater
  - Within municipal government (DPW)
  - Independent governance (enterprise fund)
  - Regional entity
  - Wastewater treatment facility vs collection system can be independently governed, funded, and operated

Wastewater Heat Recovery – The Energy Source

Factors to take into consideration

- Distance to site of energy use
- Wastewater volume
- Wastewater temperature
  - Temperature gradient
  - Desired outlet temperature
- Maintenance capacity
- Relationship with energy recipient
  - Potential for 3rd party ownership/operation

Wastewater Heat Recovery – The Energy Recipient

Factors to take into consideration

- New construction vs retrofit
- Building size
- Building type
- Current heating fuel
- Heating/cooling needs
- HVAC system's age and condition
- Distance to site of energy recovery
- Access to wastewater pipes
- Relationship with energy source

Poll Question 2

What do you think the potential for wastewater heat recovery is in your community?

a) Unsure, this is first time have heard about it
b) Is a real opportunity – going to explore options
c) Think we may have a site and plan to respond to the RFI
d) Already have a project under study
e) No real possibility

Request for Information

- Goal: to identify Massachusetts public wastewater systems and associated buildings that are potentially well suited to the installation of a wastewater heat recovery system.
  - In this stage DOER is most interested in sites that use drain or sewer pipes, not on the site of the WWTP
- DOER invites responses from municipalities and their wastewater systems who are interested in using wastewater heat recovery to heat/cool one or more buildings.

Request for Information

- Additionally, DOER invites comments and suggestions from all interested parties, including:
  - Consultants
  - Vendors
  - Drinking water systems
  - Regulators
  - 3rd party financiers

Request for Information

DOER Issues RFI	July 22, 2013
Webinar	July 31, 2013, 10-11 am
Deadline for Questions	August 2, 2013 5:00 pm *(extended to August 14)*
RFI Response Due	**August 19, 2013 5:00 pm**

Posted on Comm-Pass: ENE-RFI-2014-001

Questions to: www.comm-pass.com
Forum
Browse All Active Forums
By Entity/Department
Department of Energy Resources (click checked box)
RFI-ENE-2014-001

DOER Next Steps

1. Analysis of responses to the RFI
   - Assisted by team of WPI interns
2. Select 3-5 good candidate sites
   - Conduct in-depth study to assess feasibility of installing a waste water heat recovery project
     - Including cost/benefit and financing analysis
   - Close collaboration with local authorities and other state agencies (MassDEP, MassCEC…)
3. Provide cost share towards 1-2 best projects

Poll Question 3

If your community installed a WWHR project, what building type would you select?

a) Administrative building
b) Public safety building
c) School building
d) Public works building
e) Other

Q&A

RFI Participant Information

- **Public Wastewater System/District Name (Thermal Energy Source / Energy Provider):** _____
- **Wastewater System Contact Information**
  Name_____
  Title_____
  Email_____
  Phone_____
- **Municipality or Entity Name (Thermal Energy User / Energy Recipient):** _____
- **Recipient Contact Information**
  Name_____
  Title_____
  Email_____
  Phone_____
- Please describe how the energy recipient and the energy provider have discussed working together to recover the latent energy in wastewater for use as a source of renewable thermal energy.
  _____
  _____

RFI Recipient Building Information

- **Site Name** _____
  Site Address _____
  Is this an existing building or proposed new construction? _____
  Building Type/Use _____
  Square Footage _____
  Distance between recipient building and the wastewater heat source (pipe or plant) _____
- **Occupancy** (# months/year, # days/month, # hours/day)
  Full occupancy: _____
  2/3-3/4 occupancy: _____
  Half occupancy: _____
- Please describe the current (or for new construction, the proposed) heating, cooling and hot water needs.
  _____
- **Current heating fuel source(s)** (natural gas, oil, propane, electric)
  _____
  Heating system type (steam, hot water, forced air) _____
  Age of heating system _____
- **Does the current heating system also heat hot water for building use?** _____
  If not, what is the fuel source(s) for hot water heating? _____
  Age of hot water heating system _____
- **Is the building cooled?** If yes, please indicate the cooling fuel. _____
  Cooling system type _____
  Age of cooling system _____

RFI Wastewater System Information

- Is the wastewater system an independent district? If not, is it funded by an enterprise fund?
  _____
- Will the heat recovery system harvest energy from raw wastewater or treated wastewater?
  _____
- What is the average total daily flow for the last three years for the proposed site? If unknown, please provide the average total daily flow for the system.
  _____
  _____
  _____
- Is the approximate average temperature of the wastewater known at the proposed site? If not, is there a point within the collection system at which the temperature of the wastewater is known? Please provide a description of the location and the average temperature.
- _____
  _____
  _____

RFI Third-Party Agreement

- Would the wastewater system consider a third party owning and operating a wastewater heat recovery system using the pipes that are owned and maintained by the wastewater system (similar to a third-party agreement that is often used with solar projects)?
  _____
  _____
  _____
- What concerns would the wastewater system have about a third-party agreement for wastewater heat recovery?
  _____
  _____
  _____

THANK YOU!

- The webinar was recorded and will be available for viewing at your convenience on our website at:
  www.mass.gov/energy/greencommunities
- The slide presentation will also be posted at:
  www.mass.gov/energy/greencommunities
- Contact Information:
  - Aimee.Powelka@state.ma.us